

A novel tool based on ac-QCM transducers for improving antigens/antibodies interactions.

S. Al-Sana, C. Gabrielli and H. Perrot

UPR15 du CNRS, Laboratoire de Physique des Liquides et Electrochimie, Universite P.et M. Curie, Tour 22, 4 Place Jussieu, 75252 Paris Cedex 05, France.

The detection of Ab/Ag interactions continues to be the subject of several research efforts by using various transducing techniques such as electrochemical, acoustic, optic transducers...^{1,2} In order to enhance these interactions a novel approach was tested by coupling ac-QCM (Quartz Crystal Microbalance), used under dynamic regime, and electrochemical impedances³ measurements on bioactive polymers. More precisely, the main objective of this work was to characterize the interaction between an antigen, human serum albumin (HSA) and an antibody (anti-HSA) immobilized inside polypyrrole films.

The QCM give a direct and in situ response which characterizes the binding event between the sensitive layer, and the detected analyte. Polymer films were prepared by using 0.5M pyrrole monomer in PBS, 0.2M tosylate and 0.35mg ml⁻¹ anti-HSA. The electrodeposition was performed at 0.7V/ECS during 35s.

This study was mainly focused on the investigation of the electrochemical behavior of anti-HSA immobilized pPy films. Two types of film were tested : pPy without and with anti-HSA. Preliminary results were given here for the microbalance response (fig.1) for anti-HSA pPy films. Apparently some species are expelled from the polymer during an oxidation potential setp. Major difference were observed by comparison with the free pPy film. Electrochemical impedance and electrogravimetric transfer function were also performed on these films. One example is given figure 2 for pPy films without anti-HSA. This figure shows the movement of one ionic species during the switching of the polymers between reduced and oxidized states.

ac-QCM coupled with electrochemical impedance measurements appear as a very attractive technique for examining the behaviour of pPy films where biomolecules were included. By this way the nature of the biochemical or ionic species can be identified.

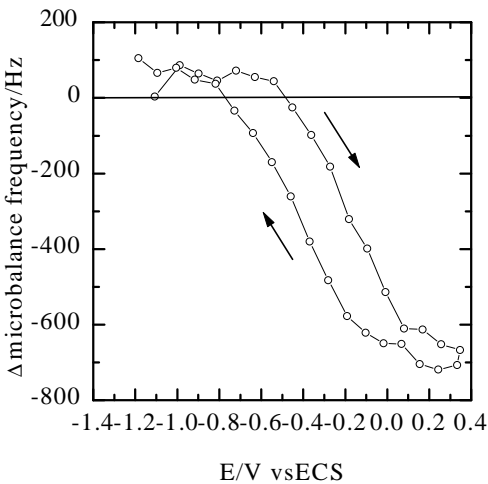


Figure 1 : microbalance frequency changes for pPy film with anti-HSA in a PBS buffer containing HSA.

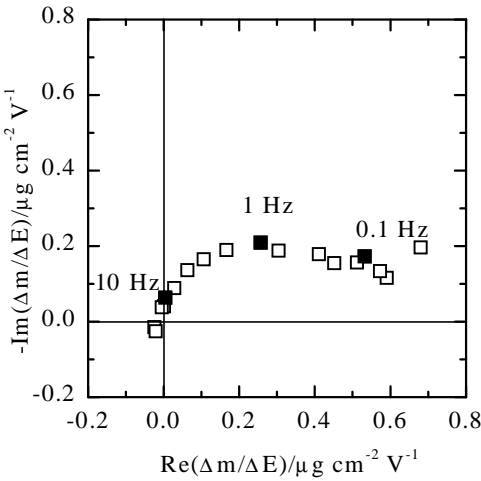


Figure 2 : electrogravimetric transfer function for pPy films tested in PBS.

References :
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